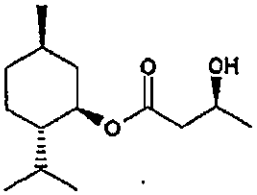
CLAIMS

1. A cooling agent comprising (3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I):

[Chem 1]



(I)

2. The cooling agent according to claim 1, wherein an optical purity at the 3-position hydroxyl group of the (3S)-l-menthyl 3-hydroxybutyrate is 50% e.e. or more.

3. A sensate composition comprising:

(3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I); and

at least one component selected from the group consisting of a cooling component other than the (3S)-l-menthyl 3-hydroxybutyrate and a warming component.

4. The sensate composition according to claim 3, wherein an optical purity at the 3-position hydroxyl group of the (3S)-l-menthyl 3-hydroxybutyrate is 50% e.e. or more.

5. The sensate composition according to claim 3 or 4, wherein the cooling component other than the (3S)-l-menthyl 3-hydroxybutyrate is at least one component selected from the group consisting of menthol, menthone, camphor, pulegol, isopulegol, cineol, mint oil, peppermint oil, spearmint oil, eucalyptus oil, 3-l-menthoxypropane-1,2-diol, N-alkyl-p-menthane-3-carboxamide, 3-l-menthoxy-2-methylpropane-1,2-diol, p-menthane-3,8-diol, 2-l-menthoxyethanol, 3-l-menthoxypropanol, l-menthyl lactate, menthone glycerol ketal, menthyl succinate, menthyl glutarate, dimenthyl glutarate and N-methyl-2,2-isopropylmethyl-3-methyl butanamide.

6. The sensate composition according to claim 3 or 4, wherein the warming component is at least one component selected from the group consisting of vanillyl

ethyl ether, vanillyl propyl ether, vanillin propylene glycol acetal, ethyl vanillin propylene glycol acetal, capsaicin, gingerol, vanillyl butyl ether, 4-(l-menthoxymethyl)-2-phenyl-1,3-dioxolan, 4-(l-menthoxymethyl)-2-(3',4'-dihydroxyphenyl)-1,3-dioxolan, 4-(l-menthoxymethyl)-2-(2'-hydroxy-3'-methoxyphenyl)-1,3-dioxolan, 4-(l-menthoxymethyl)-2-(4'-methoxyphenyl)-1,3-dioxolan, 4-(l-menthoxymethyl)-2-(3',4'-methylenedioxyphenyl)-1,3-dioxolan, 4-(l-menthoxymethyl)-2-(3'-methoxy-4'-hydroxyphenyl)-1,3-dioxolan, vanillin acetals, red pepper oil, red pepper oleoresin, ginger oleoresin, nonylic acid vanillylamide, jambu oleoresin, Japanese pepper extract, sanshool-I, sanshool-II, sanshoamide, black pepper extract, chavicine, piperine and spilanthol.

7. A flavor or fragrance composition comprising (3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I) described in claim 1 in an amount of 0.001 to 90 weight% based on the total amount of the flavor or fragrance composition.

8. The flavor or fragrance composition according to claim 7, wherein an optical purity at the 3-position hydroxyl group of the (3S)-l-menthyl 3-hydroxybutyrate is 50% e.e. or more.

9. A product comprising (3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I) described in claim 1 in an amount of 0.0001 to 30 weight% based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a daily necessities and household goods, an oral composition and a pharmaceutical.

10. The product according to claim 9, wherein an optical purity at the 3-position hydroxyl group of the (3S)-l-menthyl 3-hydroxybutyrate is 50% e.e. or more.

11. A flavor or fragrance composition comprising the sensate composition according to claim 3 or 4 in an amount of 0.001 to 90 weight% based on the total amount of the flavor or fragrance composition.

12. A flavor or fragrance composition comprising the sensate composition according to claim 5 in an amount of 0.001 to 90 weight% based on the total amount of the flavor or fragrance composition.

13. A flavor or fragrance composition comprising the sensate composition according to claim 6 in an amount of 0.001 to 90 weight% based on the total amount of the flavor or fragrance composition.

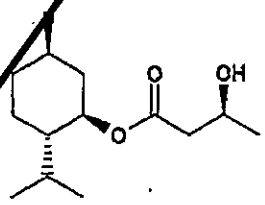
14. A product comprising the sensate composition according to claim 3 or 4 in an amount of 0.0001 to 30 weight% based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a daily necessities and household goods, an oral composition and a pharmaceutical.

15. A product comprising the sensate composition according to claim 5 in an amount of 0.0001 to 30 weight% based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a daily necessities and household goods, an oral composition and a pharmaceutical.

16. A product comprising the sensate composition according to claim 6 in an amount of 0.0001 to 30 weight% based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a daily necessities and household goods, an oral composition and a pharmaceutical.

17. A method for producing (3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I):

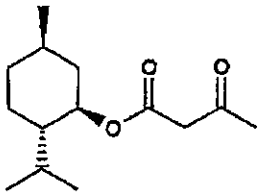
[Chem. 3]



(I)

which comprises subjecting l-menthyl acetoacetate represented by the formula (II) to asymmetric hydrogenation:

[Chem. 2]



(II)

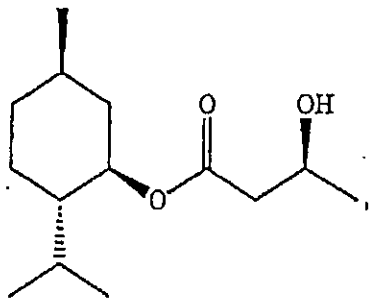
18. The method for producing (3S)-l-menthyl 3-hydroxybutyrate according to claim 17, which comprises synthesizing the l-menthyl acetoacetate by subjecting a mixture of l-menthol and methyl acetoacetate to transesterification in the absence of a catalyst or in the presence of a protonic acid catalyst, and in the absence of a solvent or in an aliphatic hydrocarbon having 5 to 8 carbon atoms.

19. A method for imparting a cooling sensation to a flavor or fragrance composition, a food or drink, a fragrance or cosmetic, a daily necessities and household goods, an oral composition or a pharmaceutical, which comprises adding (3S)-l-menthyl 3-hydroxybutyrate represented by the formula (I) described in claim 17 to the flavor or fragrance composition, food or drink, fragrance or cosmetic, daily necessities and household goods, oral composition or pharmaceutical.

20. The method according to claim 19, wherein an optical purity at the 3-position hydroxyl group of the (3S)-l-menthyl 3-hydroxybutyrate is 50% e.e. or more.

The invention claimed is:

1. A sensate composition comprising (3S)-1-menthyl 3-hydroxybutyrate of formula (I),



and at least one component selected from the group consisting of a cooling component other than the (3S)-1-menthyl 3-hydroxybutyrate and a warming component.

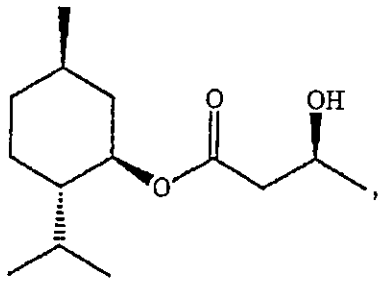
2. The sensate composition according to claim 1, wherein an optical purity at the 3-position hydroxyl group of the (3S)-1-menthyl 3-hydroxybutyrate is 50% e.e. or more.

3. The sensate composition according to claim 1 or 2, wherein the cooling component other than the (3S)-1-menthyl 3-hydroxybutyrate is at least one component selected from the group consisting of menthol, menthone, camphor, pulegol, isopulegol, cineol, mint oil, peppermint oil, spearmint oil, eucalyptus oil, 3-1-menthoxypropane-1,2-diol, N-alkyl-p-menthane-3-carboxamide, 3-1-menthoxy-2-methylpropane-1,2-diol, p-menthane-3,8-diol, 2-1-menthoxyethanol, 3-1-menthoxypropanol, 1-menthyl lactate, menthone glycerol ketal, menthyl succinate, menthyl glutarate, dimenthyl glutarate and N-methyl-2,2-isopropylmethyl-3-methyl butanamide.

4. The sensate composition according to claim 1 or 2, wherein the warming component is at least one component selected from the group consisting of vanillyl ethyl ether, vanillyl propyl ether, vanillin propylene glycol acetal, ethyl vanillin propylene glycol acetal, capsaicin, gingerol, vanillyl butyl ether, 4-(1-menthoxymethyl)-2-phenyl-1,3-dioxolan, 4-(1-menthoxymethyl)-2-(3',4'-dihydroxyphenyl)-1,3-dioxolan, 4-(1-menthoxymethyl)-2-(2'-hydroxy-3'-methoxyphenyl)-1,3-dioxolan, 4-(1-menthoxy-methyl)-2-(4'-methoxyphenyl)-1,3-dioxolan, 4-(1-menthoxymethyl)-2-(3',4% methylenedioxyphenyl)-1,3-dioxolan, 4-(1-menthoxymethyl)-2-(3'-methoxy-4'-hydroxyphenyl)-1,3-dioxolan, van-

illin acetals, red pepper oil, red pepper oleoresin, ginger oleoresin, nonylic acid vanillylamide, jambu oleoresin, Japanese pepper extract, sanshool-I, sanshool-II, sanshoamide, black pepper extract, chavicine, piperine and spilanthol.

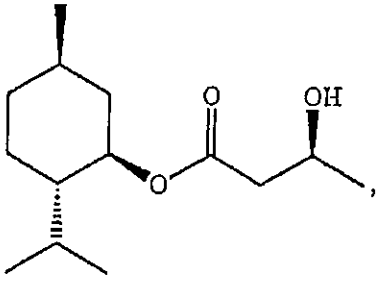
5. A flavor or fragrance composition comprising (3S)-1-menthyl 3-hydroxybutyrate of formula (I),



in an amount of 0.001 to 90 weight % based on the total amount of the flavor or fragrance composition.

6. The flavor or fragrance composition according to claim 5, wherein an optical purity at the 3-position hydroxyl group of the (3S)-1-menthyl 3-hydroxybutyrate is 50% e.e. or more.

7. A product comprising (3S)-1-menthyl 3-hydroxybutyrate of formula (I),



in an amount of 0.0001 to 30 weight % based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a hair care product, soap, a body wash, a bath agent, a cleanser, a soft finishing agent, a detergent, a kitchen cleaner, a bleach, an aerosol, a deodorant, a repellent, a cigarette ~~product, tissue paper, toilet paper, an oral composition, and a~~ pharmaceutical.

8. The product according to claim 7, wherein an optical purity at the 3-position hydroxyl group of the (3S)-1-menthyl 3-hydroxybutyrate is 50% e.e. or more.

9. A flavor or fragrance composition comprising the sensate composition according to claim 1 or 2 in an amount of 0.001 to 90 weight % based on the total amount of the flavor or fragrance composition.

10. A flavor or fragrance composition comprising the sensate composition according to claim 3 in an amount of 0.001 to 90 weight % based on the total amount of the flavor or fragrance composition.

11. A flavor or fragrance composition comprising the sensate composition according to claim 4 in an amount of 0.001 to 90 weight % based on the total amount of the flavor or fragrance composition.

12. A product comprising the sensate composition according to claim 1 or 2 in an amount of 0.0001 to 30 weight % based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a hair care product, soap, a body wash, a bath agent, a cleanser, a soft finishing agent, a detergent, a kitchen cleaner, a bleach, an aerosol, a deodorant, a repellent, a cigarette product, tissue paper, toilet paper, an oral composition and a pharmaceutical.

13. A product comprising the sensate composition according to claim 3 in an amount of 0.0001 to 30 weight % based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a hair care product, soap, a body wash, a bath agent, a cleanser, a soft finishing agent, a detergent, a kitchen cleaner, a bleach, an aerosol, a deodorant, a repellent, a cigarette product, tissue paper, toilet paper, an oral composition and a pharmaceutical.

14. A product comprising the sensate composition according to claim 4 in an amount of 0.0001 to 30 weight % based on the total amount of the product, wherein the product is selected from the group consisting of a food or drink, a fragrance or cosmetic, a hair care product, soap, a body wash, a bath agent, a cleanser, a soft finishing agent, a detergent, a kitchen cleaner, a bleach, an aerosol, a deodorant, a repellent, a cigarette product, tissue paper, toilet paper, an oral composition and a pharmaceutical.